REMARKS

Claims 1-16 have been examined. Claim 17 has been added to further describe the patentable features of the present invention. Claims 6 and 13 have been canceled without prejudice or disclaimer. Applicants reserve the right to pursue these claims in a divisional or continuation application.

In addition, the Examiner failed to acknowledge acceptance of the drawings. Therefore, Applicants respectfully request the Examiner to indicate that the drawings are accepted in the next action.

Double Patenting Rejection

Claims 1, 3-4, 5-6, 8, 10-13 and 15 are provisionally rejected on the grounds of nonstatutory obviousness-type double patenting over claims in US Application No. 11/325,451 ("the '451 application").

The Examiner provisionally rejects Claims 1, 8 and 15 on the ground of non-statutory obviousness-type double patenting as being unpatentable over Claims 1, 4-5, 7 and 9 of co-pending Application No. 11/326,451. Furthermore, the Examiner provisionally rejects Claims 3-4 and 10-11 on the ground of non-statutory obviousness-type double patenting as being unpatentable over Claim 2 of co-pending Application No. 11/326,451 Lastly, the Examiner provisionally rejects Claims 5-6 and 12-13 on the ground of non-statutory obviousness-type double patenting as being unpatentable over Claims 3, 10 and 15 of co-pending Application No. 11/326,451.

Applicants respectfully request that the Examiner hold the double patenting rejection in abeyance, as the Applicants will submit a terminal disclaimer shortly.

Rejection of Claims 5, 12 and 16 Under 35 U.S.C. § 102

Claims 5, 12 and 16 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Hershberger (US 6,71,214). Claims 5 and 12 have been amended to include the features of claims 6 and 13, respectively. Claim 16 depends upon claim 12. Therefore, the rejection is moot in view of the amendments. Applicants traverse the rejection in conjunction with claims 6-7 and 13-14 below.

Rejection of Claims 6-7 and 13-14 Under 35 U.S.C. § 103

Claims 6-7 and 13-14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hershberger in view of Liljeryd (US 6,680,972).

In view of the amendments to claims 5 and 12, Applicants traverse the rejection as follows.

Claim 5 recites:

> a first generator which generates a cosine signal;
> a first multiplier which multiplies an input signal by the cosine signal to generate a first multiplied signal;
> a first low-pass filter which low-pass filters the first multiplied signal to generate a first low-pass filtered signal;
> a second multiplier which multiplies the first low-pass filtered signal by the cosine signal to generate a second multiplied signal;
> a second generator which generates a sine signal;
> a third multiplier which multiplies the input signal by the sine signal to generate a third multiplied signal;
> a second low-pass filter which low-pass filters the third multiplied signal to generate a second low-pass filtered signal;
> a third generator which generates a negative sine signal;
> a fourth multiplier which multiplies the second low-pass filtered signal by the negative sine signal to generate a fourth multiplied signal;
> a summation unit which sums the second multiplied signal obtained by the second multiplier and the fourth multiplied signal obtained by the fourth multiplier to generate a summed signal; and
> an adder which adds the summed signal to the input signal.

The Examiner asserts that the second generator which generates a sine signal reads on the digital frequency synthesizer 170 of Hershberger; the third multiplier which multiplies the input signal by the sine signal to generate a third multiplied signal reads on the digital multiplier 142; the second low-pass filter which low-pass filters the third multiplied signal to generate a second low-pass filtered signal reads on the low-pass filter 148; the third generator which generates a negative sine signal reads on the digital frequency synthesizer 166; the fourth multiplier which multiplies the second low-pass filtered signal by the negative sine signal to generate a fourth multiplied signal reads on the digital multipliers 176 or 164; and the summation unit which sums the second multiplied signal obtained by the second multiplier and the fourth multiplied signal obtained by the fourth multiplier to generate a summed signal reads on the digital adder 168.

However, the digital frequency synthesizer 170 (the alleged second generator) of Hershberger does not generate a sine signal which is multiplied by the input signal by the digital multiplier 142 (the alleged third multiplier) to generate the claimed third multiplied signal. Applicant notes that the input signal is the same input signal which is input to the first multiplier to generate the first multiplied signal.

In addition, the digital frequency synthesizer 166 (the alleged third generator) of Hershberger does not generate a negative sine signal which is multiplied by the second low-pass filtered signal generated from the low-pass filter 148 (the alleged second low-pass filter) by either of the digital multipliers 176 or 164. Furthermore, once the output of the low-pass filter 148 is multiplied by digital multiplier 176, the signal is no longer the claimed second low-pass filtered signal, which is generated by the low-pass filter, not the multiplier or other subsequent components. Moreover, the digital frequency synthesizer 166 does not generate a negative sine

signal at all. There is no teaching of suggestion in Hershberger to implement a negative sine signal as claimed in the present invention. Furthermore, the Examiner appears to fail to assert this complete element (i.e., a third generator which generates a negative sine signal) in the rejection.

Also, Liljeryd does not correct these deficiencies of Hershberger. Therefore, Applicants respectfully submit that claim 5 would not have been rendered obvious under 35 U.S.C. § 103(a) by Hershberger in view of Liljeryd, because the references, alone or in combination, do not teach or suggest all of the features of the claim. Furthermore, claim 12 contains analogous, though not necessarily coextensive features recited in claim 5, and, therefore, claim 12 is patentable for the reasons discussed for claim 5. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of claim 5 and 12, and claims 7, 14 and 16 *at least* by virtue of their dependency.

Rejection of Claims 1-2, 8-9 and 15 Under 35 U.S.C. § 103

Claims 1-2, 8-9 and 15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Oki et al. (US 4,972,489) in view of Johnson et al. (US 7184,556).

The present invention relates to a an apparatus for reconstructing a high frequency part of an audio signal. In particular, claim 1 recites:

> An apparatus for reconstructing a high frequency part of a first signal, the apparatus comprising:
> a frequency inverter which inverts a frequency of an input signal to generate a frequency-inverted input signal;
> a band-pass filter which filters a high frequency part of the frequency-inverted input signal to generate a filtered signal;
> a converter which shifts a frequency of the filtered signal so as not to generate an aliasing of the input signal and the filtered signal to generate a frequency-shifted signal; and

an adder which adds the frequency-shifted signal to the input signal.

Turning to the cited art, Oki relates to a sound reproduction system which eliminates a low frequency standing wave in order to provide a desirable frequency response characteristic (Abstract). Oki, however, does not teach or suggest reconstructing the high frequency part of a signal, as claimed. That is, the elimination of a low-frequency standing wave for correcting a response characteristic does not translate into a reconstruction of a portion of a signal. The standing wave is produced when a sound wave is issued in a space of limited size, wherein the sound wave makes resonance or anti-resonance (col. 3, lines 38-45 and Fig. 6). Thus, an elimination of a portion of a signal effect is not a reconstruction of a high frequency part of a signal. Moreover, the frequency-shifted signal of the present invention is added to the input signal, which includes the low frequency part of the signal.

In addition, the Examiner concedes that Oki fails to teach or suggest a frequency inverter and a converter, and cites to Johnson to correct these deficiencies. Johnson relates to a compensation system that uses parametric values to control or adjust processes having transforms or models with properties or responses like the components or elements used in the transmission or reproduction system (col. 1, lines 12-18). However, there is no teaching in the cited art to modify Oki with the teachings of Johnson, as suggested by the Examiner.

As stated above, Oki relates to the elimination of a low frequency standing wave. In order to eliminate the low frequency standing wave, Oki teaches first passing the input signal through the first and second band-pass filters in order to produce components of restricted frequency bands of the input signal at the listening points (e.g., 1.0 KHz and 200 Hz) (col. 3, lines 12-25). Since it is desired to produce components of restricted frequency bands of the input

signal of respective ranges at the listening points, one skilled in the art would not invert the input signal, and thus also the frequencies at the listening points, prior to filtering (producing) the components of the restricted frequency bands. Oki also teaches that the phases of the signals of 1.0 KHz and 200 Hz are shifted (e.g., phase shift of 360 degrees) such that the shifted signals can be mixed with the original input signal to eliminate the standing wave (col. 3, lines 24-37 and col. 4, lines 7-30). Thus, if the input signal of Oki is inverted prior to producing the components of restricted frequency bands (i.e., prior to the input to the band-pass filters), the shifted signals will not cancel out the desired components of the input signal, since the frequency of the shifted signals would be inverted in reference to the listening points of the input signal. That is, the frequencies of the shifted inverted signals, alleged by the Examiner, would not be able to properly eliminate the standing wave form. Thus, not only would the modification require a fundamental redesign of the references in a manner not contemplated by the combination (see In re Ratti, 123 U.S.P.Q. 349, 352 (CCPA 1959)), the suggested modifications also would render the Oki reference inoperable for its intended purposes.

Furthermore, 200 Hz and 1 KHz are not high frequency parts, since Oki specifically teaches that it is the low frequency portions (e.g., at the listening points) which are the cause of the standing wave and are to be eliminated. Therefore, Oki does not teach or suggest a band-pass filter which filters a high frequency part of the frequency-inverted input signal to generate a filtered signal.

Moreover, the implementing a converter in Oki would not correct this deficiency. Since the claimed converter shifts a frequency of the filtered signal so as not to generate an aliasing of

the input signal and the filtered signal to generate a frequency-shifted signal, the frequency of the filtered signal remains inverted, and thus, the same problem above would remain.

In addition, Johnson does not teach or suggest a frequency inverter and a converter, as required in claim 1. Johnson relates to a system which compensates for a loudspeaker's characteristics in order to improve perceived audio quality (col. 1, lines 24-26). Thus, functional or behavioral models of loudspeakers are used in practice to develop such compensations (col. 1, lines 27-29). However, column 1, lines 51-59, of Johnson merely recites:

> One could characterize and invert the frequency response, as well as other properties, of a well-conceived model and achieve linear-phase correction of the loudspeaker.

Inverting the frequency response of a model, however, is not sufficient to teach the features of the present invention. That is, there is no teaching or suggestion in the cited art of how one skilled in the art would modify Oki with the inversion of the frequency response model disclosed in Johnson. Further, even if the device of a reference can be modified to operate in the manner of the claimed device, there must be a suggestion to do so. In re Mills, 16 U.S.P.Q.2d 1430, 1432 (Fed. Cir. 1990). The mere mentioning of inversion in Johnson, without more is not enough to correct the deficiency of Oki. Therefore, one skilled in the art would not look to Johnson to modify Oki for reconstructing a high frequency part of a signal, as claimed in claim 1.

The Examiner also asserts that Johnson teaches "a converter which shifts a frequency of the filtered signal so as not to generate an aliasing of the input signal and the filtered signal to generate a frequency-shifted signal," as recited in claim 1. In particular, the Examiner cites to column 24, lines 1-16, of Johnson for correcting the deficiency of Oki. Johnson, however,

merely teaches that tunable weighted notches can be set to sensitive frequencies to eliminate oscillation without significant loss to sounds. The elimination of oscillation, however, is not the equivalent of preventing aliasing, which is a distortion that results when a signal is sampled and reconstructed as an alias of the original signal. Oscillation, on the other hand, occurs from interferences between sound waves caused by feedback (Johnson, col. 24, lines 1-16). Moreover, Johnson merely teaches utilizing frequency shifters to randomize feedback phase in order to prevent a slow buildup of howl or high-Q loose-coupled oscillation (col. 24, lines 1-16). Johnson fails to teach or suggest a converter which shifts a frequency of the filtered signal so as not to generate an aliasing of the input signal and the filtered signal to generate a frequency-shifted signal. Also, there is no teaching or suggestion in the cited art of how one skilled in the art would modify Oki with the inversion of the frequency shifters disclosed in Johnson. There mere mentioning of a frequency shift is not enough to support the Examiner's assertion.

In view of the above, Oki, alone or in combination with Johnson, does not teach or suggest each and every feature of claim 1. Therefore, claim 1 is patentable for at least the reasons stated above.

Claims 8 and 15 include analogous, though not necessarily coextensive features, and therefore, claims 8 and 15 are also patentable for the reasons discussed for claim 1.

Claims 2 and 9 are patentable based on their dependency.

Rejection of Claims 3 and 10 Under 35 U.S.C. § 103

Claims 3 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Oki et al. and Johnson et al. as applied to claim 1 above, in view of Wakai et al. (US 5,926,065). However, Wakai does not correct the deficiencies of Oki and Johnson with respect to claims 1

and 8. Therefore, claims 3 and 10 should be patentable at least by virtue of their dependency upon claims 1 and 8, respectively.

Rejection of Claims 4 and 11 Under 35 U.S.C. § 103

Claims 4 and 11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Oki et al. and Johnson et al. as applied to claim 1 above, in view of Liljeryd et al. However, Liljeryd does not correct the deficiencies of Oki and Johnson with respect to claims 1 and 8. Therefore, claims 4 and 11 should be patentable at least by virtue of their dependency upon claims 1 and 8, respectively.

New claim

By this Amendment, Applicants have added new claim 17 to further define the claimed invention. Applicants respectfully submit claim 17 recites additional features which are not taught or suggested by the prior art of record.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

Ryan F. Heavener
Registration No. 61,512

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860
WASHINGTON OFFICE
23373
CUSTOMER NUMBER

Date: January 30, 2008